ENTOMOLOGICAL
SOCIETY OF
BRITISH COLUMBIA

PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

—OF—

BRITISH COLUMBIA

FEBRUARY, 1921
NUMBER 18
SYSTEMATIC SERIES

VICTORIA, B. C.:
PRINTED BY THE COLONIST PRINTING AND PUBLISHING CO., LTD.
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TABLE OF CONTENTS

PAGE

Proceedings 3

Report of the Secretary-Treasurer 5

Presidential Address 7

A Report on Some **Hemiptera** from British Columbia—H. M. Parshley 13

The **Sphingidae** of British Columbia—E. H. Blackmore . . . 25

Early Stages of **Nepytia Phantasmaria** Strecker—G. O. Day . . 30

Notes on the Ecological Distribution of Some **Orthoptera** from the Chilcotin District of British Columbia—E. R. Buckell . . 32

Notes on the Fauna and Flora of Mount McLean—R. Glendenning . 39

BRITISH COLUMBIA ENTOMOLOGICAL SOCIETY

PROCEEDINGS, 1921

The Twentieth Annual Meeting of the B. C. Entomological Society was held in the Chamber Court Room of the Provincial Court House, Vancouver, B. C., on Saturday, February 12th, 1921. There was an attendance of 17 members at the morning session and 22 in the afternoon.

The meeting was called to order at 9.30 a.m., and the Secretary read the annual report and statement of accounts.

Moved by Mr. Ruhman, seconded by Mr. Buckell, "That the Secretary's Report be adopted and filed." Carried.

Letters were read from Mr. Arthur Gibson, the Dominion Entomologist, and from Mr. Geo. A. Dean, President of the Society of Economic Entomologists, congratulating the Entomological Society of British Columbia upon the attainment of its twentieth anniversary and wishing it continued success. A telegram was received from Dr. D. Warnock, Deputy Minister of Agriculture, regretting his inability to be present, and wishing the Society a successful meeting.

It was moved by Mr. Kermode, seconded by Mr. Venables, "That it was desirable that this Society should be incorporated under the Benevolent Societies Act and that steps to this effect be taken by the Advisory Board." Carried.

A letter was read by the Secretary from Mr. Bigwood, Secretary of the Victoria Branch of the Engineering Institute of Canada, asking whether the Entomological Society of B. C. would combine with that and other Societies in the matter of obtaining a joint room for meeting purposes and to house a library. It was decided, after discussion, that this would be of no benefit to the Entomological Society, and it was moved by Mr. Kermode, seconded by Mr. Anderson, "That a reply to this effect be sent." Carried.

It was moved by the Secretary, seconded by Mr. Davidson, "That all papers for publication in the Society's Proceedings shall be subject to the approval of the Advisory Board, which shall decide on their suitability for publication and may suggest alterations to or reject copy, and their decision shall be final." Carried.

The Secretary mentioned that a verbal offer had been made by the Provincial Librarian to house the Society's Library in the Provincial Library, and that the books would be catalogued and properly cared for and issued to members in accordance with the Society's rules. After discussion, it was moved by Mr. White, seconded by Mr. Treherne, "That the Secretary be authorized to take up with the Provincial Librarian the matter of transferring the Society's books to the Provincial Library." Carried.

The question of issuing membership cards was taken up and discussed, and it was moved by Mr. Anderson, seconded by Mr. Treherne, "That the question of issuing membership cards be referred to the Advisory Board, which should decide as to details." Carried.

It was moved by Mr. Kermode, seconded by Mr. Ruhman, "That as the Parent Society had raised its fee to $2.00 and it would be necessary for this Society to contribute a larger amount, therefore the annual subscription to this Society shall be raised to $2.00." Carried.

The question arose as to whether the Society received the Canadian Entomologist as it was entitled to. The Secretary said that as far as he was aware no such copies were sent for the Society's library. It was moved by Mr. White, seconded by Mr. Ruhman, "That the Society apply to the Parent Society for a set of the Canadian Entomologist." Carried.

The President's Address was then read. At the conclusion of this a vote of thanks was moved by Mr. Anderson, seconded by Mr. Treherne, and carried unanimously.

Mr. Treherne's paper, entitled "A Further Review of Applied Entomology in British Columbia," was then read. At the conclusion of this a vote of thanks was tendered to Mr. Treherne for his interesting paper and for the exhaustive manner in which he had covered the subject; moved by Mr. White, seconded by Mr. Buckell.

Mr. Day's paper, "Notes on the Early Stages of **Nepytia phantasmaria,**" was read by the Secretary. As time did not admit of Mr. Cockle's paper being read, this was tabled and the meeting adjourned for lunch at 12.10 p.m. The meeting re-convened at 1.30 p.m., and the following papers were read: "Notes on the Fauna and Flora of Mt. McLean," by R. Glendenning; "Man's Influence on the Native Flora, with Special Reference to Insect Pests," by Mr. Davidson. After the discussion upon this paper, the following motion was proposed by Mr. Kermode and seconded by Mr. Winson, and carried: "That the Dominion Department of Mines be communicated with and be asked to prepare a book on the Birds of Canada West of Port Arthur, similar to a publication already issued on the Eastern birds."

Other papers given in the afternoon were: "The Sphingidae of British Columbia," by E. H. Blackmore; "Notes on **Amnesia decorata** and the Holly Bud Moth," by Mr. Downes; "Notes on the Satin Moth," by R. Glendenning; and "Notes on the Ecological Distribution of Some Orthoptera from the Chilcotin District of B. C.," by E. R. Buckell. At the conclusion of his paper a vote of thanks was tendered to Mr. Buckell for his interesting paper; movers, Davidson, Venables.

At 4.15 p.m. the election of officers was proceeded with and resulted as follows: Hon. President, F. Kermode; President, L. E. Marmont; Vice-President (Coast), R. S. Sherman; Vice-President (Interior), R. C. Treherne; Advisory Board—J. Davidson, L. E. Breun, J. W. Gibson, E. H. Blackmore, E. W. White, W. B. Anderson; Hon. Secretary-

Treasurer, W. Downes; Assistant Secretary, R. Glendenning. It was moved by Mr. Treherne, seconded by Mr. Winson, "That there be both Secretary and Assistant Secretary as formerly." Carried.

With regard to the publishing of the Proceedings of the Society, it was moved by Mr. Kermode, seconded by Mr. Winson, "That the Advisory Board have charge of this." Carried.

At 5.30 p.m. the meeting adjourned and met for supper at the Citizen's Club, Vancouver Block.

At 7.30 p.m. the members returned to the meeting room and listened to a lecture by Mr. W. B. Anderson on "Collecting Places in B. C.," illustrated with lantern slides. Points visited by Mr. Anderson in the course of his trips were shown on the screen, and specimens of certain rare lepidoptera taken during these trips were also shown. Mr. Downes read portions of Dr. Parshley's report "On Collections of Hemiptera from B. C.," and illustrated this with slides of a few of the new species described and new records for B. C. Mr. Treherne showed some slides illustrating some of the Codling Moth control work being done at Vernon, and other insect studies. Mr. Glendenning showed some slides of Mt. McLean and Mt. Cheam.

A vote of thanks was tendered to Mr. Anderson for his interesting lecture.

It was decided to hold the next year's meeting in Victoria.

REPORT OF THE SECRETARY-TREASURER

I have pleasure in submitting the report of the work of the B. C. Entomological Society for the year 1920.

The membership of the Society continues to increase, and now numbers forty-five members, nearly all of whom are paid up, only three, in fact, being in arrears with their dues, which is satisfactory and shows the continued and growing interest in the work of the Society.

Pursuant to a motion passed at last year's meeting, the Advisory Board duly considered the question of providing prizes for the best collections of insects made by public school children, and it was decided, at a meeting held on May 10th, that this should take the form of a challenge cup, to be offered for competition at the Provincial Fair at New Westminster. The sum of fifty dollars was set aside for this purpose and a handsome cup has been purchased. This was offered for competition at the last Provincial Fall Fair, and was won by John Norquay School, South Vancouver. In addition to this, a prize of $5.00 was awarded at Langley Fall Fair. This prize was offered by the Langley Agricultural Association in error, but as it is not the wish of the Society to discourage any competitor, the Advisory Board authorized that the prize money be paid.

Regarding entomological supplies, arrangements were made last year, in accordance with the wish of the Society, that these should be kept in stock by a local dealer, and Mr. Litchfield, Stationer, 1109 Government Street, now carries a supply of sheet cork, but pins were unobtainable and will have to be ordered from the makers by those wanting them.

During the year Mr. J. M. Anderson presented the Society with all his Entomological Bulletins and papers. These are all of an economic nature and are the only additions to the Society's library that have been made this year. During the summer the Society's Proceedings No. 11 were published by the Department of Agriculture. In view of the high cost of printing and the difficulty the Society has of meeting the cost of producing its bulletin, this assistance from the Department is very welcome. In various small matters, such as the cost of mailing and envelopes, we have also received assistance. Bulletin No. 14, being the proceedings of the year 1919, was published this winter. We are still in arrears with the printing of our 1920 proceedings, but as the Society has a cash balance sufficient to meet this outlay, it is hoped this may be published shortly and so bring our bulletins up to date. This is an urgent matter and I suggest to the meeting that the Society's funds should be expended on this rather than on other matters, as the value of our publications is greatly lessened by their being delayed. Bulletin No. 13, of the economic series, will be prepared for the printer during the coming season. I have to point out that with regard to the printing of these Proceedings by the Government we have to wait until their own work is out of the way and they have time to attend to ours, and this accounts for much of the delay in producing the economic series. Another reason is that we are usually short of economic papers.

The finances of the Society are in a very satisfactory condition. We have a balance in the Savings Bank, $439.80, and cash in hand to the amount of $16.02, total $455.82. Against this we are liable for the cost of printing Bulletin 14, $145.38, and $5.00 has been set aside for prize money for Langley Fair, leaving $289.42 to commence the year with. The cost of printing Bulletin 16 is estimated to be $225.00, leaving us with $64.00 in hand for current expenses. These should be light during the coming year, as we have eliminated a number of small expenditures and the matter of a cup for the best insect exhibit is already provided for.

I wish to draw the attention of the Society to the desirability of finding a more suitable location for our library. It will be remembered that this question came up and was discussed at our last meeting, but at that time no more suitable arrangement than the present one was under consideration. At present the library is located in Mr. Blackmore's house, and while we appreciate his efforts in the matter, and his generosity in providing space for it, there are decided drawbacks to the arrangement, the chief of which is that it is not readily available to

members for reference. There is also the obvious risk of fire. Recently, however, an offer has come from the Provincial Library to house the books there. I have been assured by the librarian that not only will the books be catalogued and cared for as they should be, but the library will undertake to issue them to members at a distance in conformity with the rules of the Society. I understand that the Natural History Society is making the same arrangement with regard to their library. I commend this plan to you as a most desirable one, and suggest that the Society give the offer of the Provincial Library their consideration and approval.

W. DOWNES, Hon. Secretary-Treasurer.

PRESIDENTIAL ADDRESS, 1921

By E. H. Blackmore, F.E.S.

Gentlemen,—I did not intend to inflict an address upon you at this meeting, but being the twentieth anniversary of the founding of our Society, it is perhaps appropriate that I should say a few words on the progress of entomology in the Province during the last few years. As our worthy Vice-President, Mr. R. C. Treherne, is giving a review of economic entomology in B. C. during the same period, I will confine myself to the systematic side.

Mr. G. O. Day, in his presidential address in January, 1914, gave a rather comprehensive account of the work of the earlier entomologists in B. C., and also of the activities of the Society from its inception up to the end of the year 1913. His very interesting address is printed in full in No. 4 of our Proceedings, and it is an address that is well worth reading a second time, as it contains much valuable information, and I would like to recommend its perusal to our more recent members. I will take up, in as brief a manner as possible, the progress of systematic entomology since that date to the present time, including the part that the Society, through its active members, has played during that period. Before doing so, however, I would like to add a few remarks on the earlier days of entomology in B. C., which were not included in Mr. Day's paper.

The first scientific collector of insects on Vancouver Island of which we have any authentic record was a Mr. G. R. Crotch, who collected in the vicinity of Victoria in the month of July, 1871, some fifty years ago. After leaving Victoria Mr. Crotch went to California, where he collected extensively for the Museum of Comparative Zoology, at which institution many of his Vancouver Island captures are still to be seen. In 1876 Adolpheus S. Packard published his "Monograph of the Geometridae of North America," in which he described as new many of the species that were taken by Mr. Crotch at Victoria, so that Victoria and

Vancouver Island were well to the front in the first great work written on this family of moths in North America. Over forty species of Geometers are mentioned by Packard as being taken in Victoria by Mr. Crotch on that trip.

The work of the late Rev. G. W. Taylor, from the time he settled on Vancouver Island in 1877 until the formation of the B. C. Ent. Socy. in 1901, and of which Mr. Taylor was the first president, is fully treated of in Mr. Day's paper already alluded to, as is also the valuable work of the late Capt. R. V. Harvey.

The next active collector that we have record of was the late Mr. W. H. Danby, who came here from New York about the year 1888. He collected a number of species in and around Victoria and Goldstream, specimens of which were sent to his old time New York friend, Mr. B. Neumogen, who was himself a well known entomologist at that time, and who described many of Mr. Danby's captures as new, naming two of them after Mr. Danby, viz., **Diacrisia danbyi** and **Gluphisia danbyi.**

In 1896 the Rev. Geo. Hulst published a work on the "Classification of the Geometrina of North America," which was the first revision of this family since Packard's Monograph in 1876, just twenty years previous. In this publication Hulst described a number of new species, several of them being species sent to him by Mr. Danby from Victoria, one of which was named **Paraptera danbyi** in honour of the collector. (As regards this particular geometer it is a most singular thing that although it was described nearly twenty-five years ago, it has not been found in any other locality than Victoria, B. C., and even there is only taken in a somewhat limited area. It is called the big winter moth and emerges about the middle of November. The females are wingless.) In 1897 Mr. Danby moved to Rossland, B. C., where he collected actively for several years. Amongst his captures in this district there were many that were naturally new to B. C., and included several new to science, amongst which was **Jubarella danbyi,** named by Dr. Hulst in 1898.

In passing I may say that Mr. Danby died at his home in Victoria last May. He had been in failing health for some years, in fact for the three years preceding his death he had been partially paralyzed, the result of several strokes.

Associated with Mr. Danby in entomological work was Mr. C. de Blois Green, who had a ranch at Fairview. Mr. Green collected diurnals almost exclusively, and it was from this district that our first records from the Interior were obtained. In those early days there does not seem to have been any collections made in the other orders of insects, excepting perhaps Coleoptera, at any rate no reference is made to them in any of the local literature of that time. The first record of Coleoptera that I can find is a list by the late Rev. G. W. Taylor in 1885, entitled

"Notes on 76 species of Cicindelidae and Carabidae collected near Victoria." Forty of these were apparently new to the Canadian Fauna. The next reference to this order was a list of beetles collected by the Rev. J. H. Keen at Masset, Queen Charlotte Islands. They comprised 142 species and were presented by him to the Provincial Museum in 1897. No further lists in any order appear to have been published until the appearance of the Quarterly Bulletins of this Society, which commenced in March, 1906. Ten of these Bulletins were issued, the last one bearing the date of June, 1900. Much interesting information is contained in them, and partial lists of many orders were given, apparently the work of one man—the late Capt. R. V. Harvey. I would like to see these lists revived, as our knowledge of the species in many orders is woefully deficient, but I am glad to say that in a few orders in which some of our present members are working, very useful and valuable records are being compiled, and I sincerely hope that the day is not far distant when we shall be able to publish fairly complete lists of the chief orders of insects occurring in the Province. While speaking of lists and before taking up the more recent work of our members, a few brief words on those that have been published in the past will probably be of interest. To my mind a comparison of lists of different dates is a fairly accurate indication of the work accomplished between the times of their compilation. At any rate a comparison of our B. C. lists shows this to a marked degree. The following notes refer to Lepidoptera exclusively—this order being the one which has the largest number of students and is also the one which first attracts the attention of the young collector.

The first list that I can find that is devoted to B. C. insects was published in 1891. It is contained in a publication entitled, "Papers and Communications read before the Natural History Society of British Columbia," Vol. 1, No. 1. It contains a list of 29 species of butterflies taken in Victoria in the preceding year.

In 1893 the same society published another Bulletin, which contained a "Report on the Entomology of British Columbia by W. H. Danby and C. de Blois Green." Some progress had been made in those two years, as the 29 species of Butterflies had grown into 90, along with 71 species of moths, which included 2 sphingids, 9 arctiids and 53 noctuids. The geometers taken at that period were not named, owing to the difficulty of getting them determined.

In 1898 the late John Fannin published a "Preliminary List of the Collections of Natural History and Ethnology in the Prov. Museum." Apparently very little entomological work had been done during those five years, as the butterflies had only been increased by four species and the noctuids by two. The geometers still remaining unlisted.

In 1903 Dr. H. G. Dyar visited the Kaslo district where, under the guidance of one of our old members, Mr. J. W. Cockle, he made large

and extensive collections of Lepidoptera during the entire summer. In the fall he paid a visit to Vancouver Island, where he made the acquaintance of many of our old members and continued his collecting activities. In 1904 he issued his "List of the Lepidoptera of the Kootenai District," and that gave a great impetus to systematic collecting in the Province.

Following upon this was a "Check List of B. C. Lepidoptera," compiled by Mr. F. Kermode with the assistance of Mr. E. M. Anderson, and issued under the auspices of the Provincial Museum. It was made up from specimens in the Museum collection with the additions contained in Dr. Dyar's "Kootenai List." This was a distinct advance and served as a basis for future work. It contained the names of over 1,000 species and contained the first list of Geometridae and Micro-lepidoptera published in the Province; one hundred and eighty-seven species of geometers were recorded and 226 species of micros.

Naturally there were many errors in it—misidentifications and duplication of names, that is to say, in some cases the same insect was listed under two or more names. Much valuable work was done during the next two years, and a large number of species in the different families were added to the ever-growing list, and it was finally decided by the officers of this Society to bring out a new Check List of B. C. Lepidoptera. It was eventually issued in the fall of 1906, under the auspices of the Provincial Department of Agriculture. It was a great improvement on the previous list, as many of the most glaring errors had been removed and a number of new additions were recorded. No less than seventeen species of geometers and 51 species of micros being added in those two seasons. Since then no further Check List has been published, although additions and corrections in many of the families have been noted from time to time. These are to be found in (1) the Bulletins of the B. C. Ent. Socy. 1906 to 1908, (2) the Proceedings of our Society from 1914 up to the present issue, and (3) the Annual Reports of the Provincial Museum from 1915 to date, the latter having been especially useful, as it regularly contains two half tone plates representing new or rare species of Lepidoptera, many of which have not been figured elsewhere.

Just to show the amount of work that has been accomplished during the last few years, I have taken the following figures from my manuscript list of B. C. Lepidoptera.

At present I have listed 189 diurnals, 518 noctuids, 310 geometrids and over 400 species of micros. I have left out the figures of the other families, as they are comparatively small. These figures show a large increase over the number of species recorded in the 1906 list. To be exact, they show an addition to our fauna during this period of 57 butterflies, 129 noctuids, 106 geometers and 125 micros.

There are a large number of past and present members who have contributed in a greater or lesser degree to this knowledge of our lepidopterous fauna. Some of them have passed away, others have given up active collecting through various reasons, but the majority, I am pleased to say, are still with us. Their names in alphabetical order are: E. M. Anderson, W. B. Anderson, T. Bryant, the late A. H. Bush, W. R. Carter, J. W. Cockle, A. J. Croker, G. O. Day, W. Downes, A W. Hanham, the late Capt. R. V. Harvey, L. E. Marmont, A. W. Phair, R. Sherman, the late Rev. G. W. Taylor, R. C. Treherne, the late Tom Wilson, and I suppose that I may also add my own name, as I have done a little towards discovering some new species, especially amongst the Geometridae.

Turning to the other orders, I would like to acknowledge the great amount of good work accomplished in the order Diptera by Mr. R. Sherman, who has proved himself a worthy successor to the late Capt. R. V. Harvey. In recent years Mr. Sherman has made a special study of the family **Mycetophilidae** or Fungus gnats, and the result of his labours is shown in the magnificent list of species given in No. 14 of our Proceedings, which has recently come to hand; 139 different species are listed, 35 of which are new to science, and are being described by him. I am especially pleased to see this, and I sincerely hope that we shall have similar lists in various other orders in the near future.

In the other two large orders, Coleoptera and Hymenoptera, apparently very little work has been recorded. Mr. A. W. Hanham still keeps adding to his large collection of B. C. Coleoptera, and I am sure that a list of the specimens in his cabinets, together with the new species that have been described in recent years, would make a fairly complete record of our coleopterous fauna.

The order Hymenoptera seems to have been altogether neglected of late years, which is to be regretted, as I am confident that we have a large and practically untouched field in which to work, especially in that section known as Parasitic Hymenoptera. Mr. W. B. Anderson, whose duties take him to all parts of the Province, has, however, collected considerable material in this as well as in other orders of insects. This material is now being worked over in Ottawa, and I shall be very much surprised if many species new to science are not amongst it.

During the last three seasons Mr. W. Downes has been applying himself very diligently to the study of that hitherto much neglected order Hemiptera and with most satisfactory results. This order is divided into two sections, the Heteroptera and the Homoptera. In the former group 129 species new to B. C., including six species new to science, have been added to our former somewhat meagre list; in the latter group (the Homoptera) 42 species new to B. C. have been recorded. These additions bring the total of known Heteroptera in this Province to some 206 species and the Homoptera to about 70.

Much of the material in this latter section is as yet unidentified, but when thoroughly worked over, there will probably be found amongst them several new to science as well as many new to B. C. The collectors who have assisted Mr. Downes with material, etc., are: E. M. Anderson, E. R. Buckell, A. W. Hanham, Mrs. W. W. Hippisley, A. W. Phair, M. H. Ruhman, R. Sherman, R. C. Treherne, E. P. Venables and R. C. Woodward.

Mr. E. R. Buckell, who has been making a special study of the grasshopper outbreak in the Chilcotin country, has added considerably to our knowledge of the order Orthoptera, and has recorded several species new to British Columbia.

The order Thysanoptera is one of the most neglected orders in Canada, but Mr. R. C. Treherne has made an exhaustive study of one of its chief families., i.e., the **Aeolothripidae.** In No. 12 of our Proceedings (Feb. 1918) Mr. Treherne gave a very interesting paper on this family, which was of great taxonomic value. It contained references to all the known species, with keys to the genera and species, also a plate of diagrammatic outlines of the wing and female antenna, shaded to show the specific characters of 10 different species.

In a further article in the Can. Ent., August, 1919, Mr. Treherne described a new species of Thrips from Vernon, under the **Aeolthrips auricestus.** As some of the species of this family are of great economic importance, Mr. Treherne's work in this group is very valuable.

I think, gentlemen, that you will agree with me that this Society has justified the twenty years of its existence, and that we have a record of which we can be justly proud.

In conclusion I wish to thank you for giving me so patient a hearing, but as this is probably the last time that I shall address you as your President, I would like to say that this recapitulation of our past efforts should be a stimulus to every one of us to do his best in his own selected field, for much work yet remains to be done.

A REPORT ON SOME HEMIPTERA FROM BRITISH COLUMBIA*

By H. M. Parshley, Smith College

The entomological fauna of British Columbia is rapidly becoming better known, chiefly through the assiduous collecting and study of the enthusiastic resident entomologists, and in due time we may look forward to the publication of a full list of the insects of the region, a work which will be of the greatest value in the study of geographical distribution if it is based on data sufficiently extensive to make the enumeration truly representative. A great deal remains to be done, however, before the knowledge of some of the orders can be considered adequate, as is well illustrated in the case of the Hemiptera. In an earlier report[1] I recorded 90 species in addition to the 86 given in Van Duzee's "Catalogue," making a total of 176 known to occur in British Columbia, surely far less than half the number which actually inhabit the region. Stoner[2] has recently published the record of one more (**Podisus serieventris**), and the present list adds 30, bringing the total number of species to 207. If we contrast this figure with the 450 of New England, it is clear that there is still a good opportunity for the collector; in fact, every field trip should yield unrecorded species, especially in the aquatic and semiaquatic groups.

It is worthy of remark that about half of the species recorded in the former list occur also in New England, illustrating the extraordinarily extended range of many Hemiptera, but the fauna of British Columbia is in reality much more distinctive than such incomplete data would seem to indicate. As further collecting is done in the more remote parts of the Province, the proportion of characteristic, western species will rise, and we note a tendency in this direction in the present enumeration, for of the thirty-two additional species (excluding those occurring also in the Palaeartic region) here recorded, only 11 are to be met with in New England.

Most of the material on which this report is based was sent to me for study by Mr. W. Downes, who collected much of it himself and greatly enhanced its value, as is his custom, with notes, of which he has permitted me to make free use. Through the kindness of Mr. C. A. Frost, of Framingham, Mass., I am enabled to include records of some specimens from Terrace, on the Skeena River, collected by Mrs. W. W. Hippisley.

Additional data are given for some of the species of my former list, indicated here by an asterisk (*), and certain corrections must be made, which are summarized herewith:

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*Contributions from the Department of Zoology, Smith College, No. 79.

[1]On some Hemiptera from Western Canada, Occas. Papers Mus. Zool. Univ. Michigan, No. 71, 1919, 35 pp.

[2]Notes on Scutelleroidea from Vancouver Island, Can. Ent., LII:12-13, 1920.

p. 7. Add to list of collectors, A. W. A. Phair.
p. 13. **Aradus inornatus** should read **Aradus blaisdelli** Van Duzee.
A. cinnamomeus is represented by subsp. **antennalis** Parshley.
p. 18. **Corythucha canadensis**=**C. salicis** Osborn and Drake.
p. 23. **C. hesperia**=**C. hewitti** Drake.
p. 24. **C. pura**=**C. immaculata** Osborn and Drake.
p. 30. **Phytocoris eximius** should read **P. neglectus** Knight.
p. 31. Delete **Orectoderus** spp. with data.
p. 35. **Bolteria** should read **Phyllopidea.**

Collectors: E. R. Buckell, W. Downes, A. W. Hanham, Mrs. W. W. Hippisley, M. H. Ruhmann, R. C. Treherne, E. P. Venables.

LIST OF SPECIES

Family SCUTELLERIDAE

Homaemus bijugis Uhler.* Fairview, 21-VIII-'19 (E.R.B.).

Phimodera torpida Walker. Chilcotin, 15-VII-'20 (E.R.B.). Determination confirmed by Van Duzee, who suggests the probability that this species is identical with **P. binotata** Say.

Vanduzeeina balli Van Duzee. Chilcotin, 16, 18-VI-'20 (E.R.B.). Determined by Van Duzee.

Family CYDNIDAE

Galgupha atra Amyot & Serville. Enderby, 22-VIII-'20 (W.D.). Malloch[3] has recently proposed a generic rearrangement of the species placed under Thyreocoris in Van Duzee's "Catalogue." Much as we deplore any undue multiplication of genera, we must nevertheless accept a well founded partition of a group composed of generically discordant elements, as this seems to be. The matter cannot be considered as wholly settled, however, as Horvath has also turned his attention to the subdivision of Thyreocoris, in a work[4] which I have just received from the author, and some adjustments may be necessary in combining the two independent treatments.

Corimelaena montana Van Duzee. Enderby, 22-VIII-'20 (W.D.). Taken on mullein with the preceding.

Family PENTATOMIDAE

Carpocoris remotus Horvath.* Walhachin, 23-VII-'18 (E.R.B.).

Neottiglossa sulcifrons Stal. Victoria, 30-VIII-'20 (W.D.); Vernon (*fide* Downes).

Banasa dimidiata Say.* Terrace, VI-IX (W.W.H.).

Elasmostethus cruciatus Say.* Terrace, VI-IX (W.W.H.).

Perillus exaptus Say.* Terrace, VI-IX (W.W.H.).

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[3]Hart (and Malloch), Pentatomoidea of Ill., Ill. Nat. Hist. Surv., Bull. XIII:207, 1919.

[4]Analecta ad cognitionem Cydnidarum, Ann. Mus. Nat. Hungarici, XVII: 205-273, 1919.

Podisus modestus Dallas.* Terrace, VI-IX (W.W.H.).

Zicrona caerulea Linne. Duncan, VII-'18 (A.W.H.). Taken on alder. This is one of the most widely distributed of the Hemiptera.

Family COREIDAE

Ceraleptus pacificus Barber. Saanich Dist., 6-VI-'18 (W.D.). Determination confirmed by Barber.

Coriomeris humilis Uhler. Mara, V-'20 (R.C.T.); Saanich Dist., 7-V-'19 (W.D.). Downes' specimen was taken in sweeping blossoms of trefoil and other herbage on the slopes of Mt. Douglas, four miles north of Victoria. Barber writes me that in his opinion this cannot be distinguished by constant characters from **C. nigricornis** Stal, and if such proves to be the case, upon comparison of types, the latter name must be adopted.

Family ALYDIDAE

Alydus scutellatus Van Duzee. Mt. McLean, 20-VIII-'20.

Tollius setosus Van Duzee. Enderby, 22-VIII-'20 (W.D.).

Family CORIZIDAE

Harmostes croceus Gibson.* Goldstream, VI-'18 (A.W.H.).

Family ARADIDAE

Aradus persimilis Van Duzee. Terrace, VI-IX (W.W.H.).

Aradus blaisdelli Van Duzee. Proc. California Ac. Sci., (4) IX:333, 1920. This is the **A. inornatus** of my former report.

Aradus funestus Bergroth.* Vernon, 7-X-'18 (W.D.).

Aradus cinnamomeus* subsp. **antennalis** Parshley. This was previously noted under the specific name. The terminology used here agrees with that adopted in my "essay" on Aradus.

Mezira moesta Stal. Duncan, VII-'17 (A.W.H.).

Family LYGAEIDAE

Ortholomus longiceps Stal. Kingmere, 19-VII-'19 (R. H. Chrystal); Vernon, VII-'12.

Ischnorhynchus franciscanus Stal.* Terrace, VI-IX (W.W.H.).

Blissus occiduus Barber. Bull. Brooklyn Ent. Soc., XIII:36, 1918. Shawnigan, 22-VI-'19 (W.D.). Taken in general sweeping. This species is distinguished from **B. leucopterus** by its small size and short hemielytra, which, in the brachypterous form, are scarcely twice as long as the scutellum. Determination confirmed by Barber.

Crophius bohemani Stal. Cowichan, 24-VIII-'18 (W.D.); Royal Oak, 13-IX-'19 (W.D.); Saanich Dist., 19-IV-'18 (W.D.). Taken in general sweeping. The colour is somewhat variable in this species, one specimen showing hardly a trace of the apical pale band of the pronotum.

Sphaerobius insignis Uhler. Chilcotin, 16-VI-'20 (R.C.T.); Lillooet, (W.D.). Abundant under stones and droppings at Chilcotin. This species is ant-like in appearance and was found associated with ants.

Peritrechus fraternus Uhler.* Chilcotin, 30-IV-'20 (E.R.B.); Saanich Dist., 6-IV-'18 (W.D.).

Sphragisticus nebulosus Fallen.* Gordon Head, 16-VI-'20 (W.D.); Penticton, 22-IX-'19 (W.D.).

Eremocoris ferus Say.* Saanich Dist., 20-IV-'18 (W.D.).

Eremocoris obscurus Van Duzee.* Royal Oak, 12-IX-'19 (W.D.), found under a log; Chilcotin, 24-IV-'20 (E.R.B.), under stones on open range.

Gastrodes pacificus Provancher. Kaleden, 14-IV-'19 (E.R.B.).

Family TINGIDAE

Acalypta modesta sp. nov.

Brachypterous form.—Very pale grayish brown, head, antennae, legs, and body beneath, somewhat darker brown.

Head (including eyes) somewhat broader than long (22-16); vertex impunctate, faintly shining; frontal spines rather short and stout, blunt, about as long as second antennal segment; antennae as long as pronotum and head to base of spines, the third segment about three times as long as the fourth (20-7), very slightly enlarged at base, the fourth fusiform. Pronotum tricarinate, the disc punctato-reticulate except for the transverse, shining region of the calli; paranota rather narrow, biseriate at middle, the sides almost straight and strongly convergent, gradually rounded anteriorly, suddenly rounded and slightly prominent posteriorly; hood small, transverse, projecting anteriorly very slightly beyond posterior margin of eyes; carinae rather low, with one distinct series of areoles, the median carina highest, the lateral extending to posterior margin of calli and slightly convergent anteriorly; angulate process obtuse, its areoles distinctly smaller than those of paranota. Hemielytra extending slightly beyond apex of abdomen, very moderately convex, the main veins but little raised; sutural margin nearly straight, the apices narrowly rounded; sutural area mostly biseriate, irregularly triseriate at anterior and posterior ends; discoidal area widest, with 5 or 6 rather irregular series of areoles for most of its length, acuminate at apex; subcostal area distinctly narrower than discoidal, mostly quadriseriate, triseriate toward apex; costal area (costal membrane) uniseriate, extremely narrow, the areoles not larger than those of subcostal area; viewed from the side the costal area and hypohemielytral lamina appear about equally broad. Length male 1.84 mm, female 2.04 mm; width male .94 mm, female 1.10 mm.

Holotype, female, Royal Oak, B. C., 14-V-'17 (R. C. Treherne), in the National Collection at Ottawa.

Allotype, male, and paratype, female same data, in my collection.

This species, of which the specimens at hand were found under moss on rocks, is related to **A. lilianis** Torre-Bueno. Its most striking characteristic is its very pale colour, which is similar in the three specimens of the type series and can hardly be due to immaturity as the

individuals appear from the data to have been in hibernation and other indications of teneral condition are lacking. Structurally it may be distinguished by the narrow paranota, relatively broad discoidal area, the very narrow costal area which is scarcely wider than the hypohemielytral lamina, and the impunctate vertex, as well as by various minor points. The dorsal aspect is distinctly less convex than in allied species. The macropterous form, if this species has it, is at present unknown.

Corythucha salicis Osborn and Drake. (=**C. canadensis** Parshley*). Mission, 21-VIII-'19 (W.D.). Abundant on **Salix hookeriana.** I have recently called attention to the synonymy of this species[5]. It varies in length from 2.65 mm. to 3.57 mm., and the marginal spines are sometimes almost vestigial.

Corythucha salicata Gibson.* Mission, 21, 22-VIII-'19 (W.D.). Downes has taken this species in large numbers on **Salix lasiandra,** and a few on apple.

Corythucha hewitti Drake. Can. Ent., LI:159, June-July, 1919. (=**C. hesperia** Parshley.* *Op. cit.*, p. 23, August, 1919). Vernon, 28-IX-'19 (W.D.). Taken on hazel. Determination confirmed by Drake. This species varies considerably in darkness of markings and in the shape of the hood, which, as viewed from the side, may be almost angulate dorsally or evenly rounded.

Corythucha immaculata Osborn and Drake. (=**C. pura** Gibson*). Chilcotin, 14-V-'20 (E.R.B.). Taken on **Balsamorhiza sagittaria.** In my previous paper this species was recorded under Gibson's name.

Family REDUVIIDAE

Ploiariola canadensis Parshley.* This species, described in my previous report, has been found again by Downes in moderate numbers, "in company with **P. hirtipes.*** The latter was numerous this year on the under side of a rail on the shady side of a close board fence which separates my garden from the adjoining lot. Here they were found in all stages living among the cobwebs and apparently getting their living from the insects caught in them, though I never actually found one feeding" (from Downes' notes). With additional material I am enabled to give some further details concerning **canadensis.** The scutellar spine is not constant in size; it may be almost obsolete or as long as that of the postscutellum. The third antennal segment is about one-third as long as the second; the fourth slightly more than one-third the length of the third.

Pygolampis sericea Stal. Vancouver, 3-V-'03.

Zelus socius Uhler. Vernon, 20-VI-'19 (E.P.V.).

Family NABIDAE

Nabis subcoleoptratus Kirby. Enderby, 22-VIII-'20 (W.D.).

Nabis ferus Linne.* Terrace, VI-IX (W.W.H.).

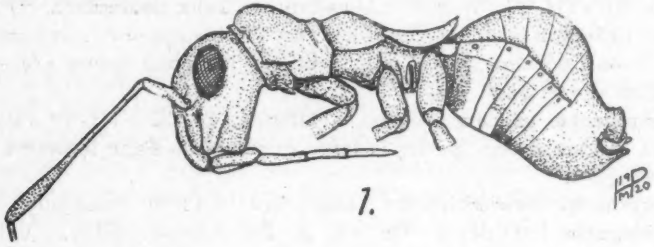
Family MIRIDAE

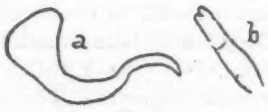
Trigonotylus ruficornis Fallen. Chilcotin, 27-VII-'20 (E.R.B.).

[5]Hem. Notices. I., Ent. News. XXXI:273, 1920.

Dacerla formicina sp. nov.

Brownish black, faintly shining, with fine sparse pale pubescence; antennae, except enlarged apical portion of second segment, legs, rostrum, and hemielytra paler brown; abdomen beneath with a basal white spot and a smaller one at base of connexivum; posterior genital segment of female marked with white on each side at base; connexivum variably brownish. In one specimen the thorax and its appendages are red, probably a teneral coloration.





Dacerla formicina sp. nov.

Fig. 1. Lateral view of male.

Fig. 2. Apical tarsal structures, showing the large, divergent arolia and the psuedo-arolia, the latter forming the thin inner margin of the claws. (Drawn by Dr. H. H. Knight).

Fig. 3. Genital claspers of the male, drawn without removal from the abdomen. a, the left clasper; b, the right.

Head triangular before eyes, narrowed behind; anteocular portion slightly broader than long (24-21); width of vertex between eyes about one-half width of head just in front of eyes; second antennal segment as long as distance from anterior margin of pronotum to apex of hemielytra, about four times the length of the first (55-13), enlarged in apical third, third and fourth segments about equal, together slightly longer than second (60-55); rostrum extending barely to middle coxae, proportions of segments as in figure 1. Pronotum tumid, short, not covering mesonotum, wider at apex than at base; mesonotum (including scutellum) almost as long on median line as pronotum (21-25), narrowed to apex from bases of hemielytra. Hemielytra about as long as pronotum, slightly upturned at apex, meeting inwardly in a straight line which is nearly one-half as long as mesonotum, apices obtusely angulate; clavus indistinct; membrane wanting. Abdomen globuliform, the

pleural region forming a thick fold. Male genital claspers shown in figure 3. Legs long and slender; arolia and claws as in figure 2. Length male 5.5 mm; female 6.5 mm.

Holotype, female, Saanich Dist., B. C., 3-VIII-'18 (W. Downes), in the National Collection at Ottawa.

Allotype, male, Saanich Dist., 1-VII-'18 (W. Downes), in my collection.

Paratypes, same data and Shawnigan, B.C., 1-VII-'18 (W.D.), in Downes', H. H. Knight's, and in my collection.

Collected on **Rubus nutkanus**, the thimbleberry or salmonberry.

This remarkable myrmecoid species is assigned to the genus Dacerla because it agrees closely with **D. inflata** Uhler in all but the structure of the pronotum and hemielytra. These parts are especially liable to superficial modifications correlated with brachyptery and ant mimicry and hence their characteristics, while sometimes striking, may properly be considered of specific rather than of generic value. The male genital claspers (Fig. 3) are very similar to those of **D. inflata**, the right somewhat longer and more slender. The arolia (Fig. 2) are precisely similar, and their structure leads us to question Van Duzee's[6] course in placing Dacerla in the Hallodapini (Dicyphinae). They are not "minute or wanting," neither are they united with nor parallel with the claws. They are in fact such as are characteristic of the Capsini (Mirinae) and if we accept the fundamental principles of Reuter's system the genus must be placed in the Capsine tribe Myrmecoraria, where Reuter located it in 1909,[7] without examination of the arolia. According to Knight's key to the subfamilies of Miridae,[8] Dacerla runs directly to the Mirinae. The striking resemblance which **D. formicina** bears to the brachypterous female of Orectoderus is shown by the fact that two students well versed in the study of the Miridae determined specimens without hesitation as "Orectoderus sp." when I submitted them for examination. When I called the attention of my friend Dr. H. H. Knight to the neglected arolia he gave me his views, upon which I have freely drawn in the above discussion, and he was kind enough to send me the drawing of the arolia and a specimen of **D. inflata** for comparison. I am indebted also to Dr. W. B. Herms, of the University of California, for a series of this species accompanied by the ant with which it was found associated and which it closely resembles as a nymph. The ant has been determined for me by Dr. W. M. Wheeler as **Formica fusca** Linn.

Phytocoris neglectus Knight. Bull. Brooklyn Ent. Soc., XV:54, 1920. Victoria, 31-VII-'18 (W.D.). This is the species recorded in

[6]Synop. Keys Genera N. Am. Miridae, Univ. Calif. Pubs. Tech. Bulls., Entom., I:210, 1916.

[7]Bemerk. neark. Capsiden, Acta. Soc. Sci. Fennicae, XXXVI, No. 2:8, 1909.

[8]Jour. New York Ent. Soc., XXVI:40-44.

my former paper as **P. eximius.** Specimens have been compared with the types by Knight. The species has been known hitherto from Michigan and Minnesota and eastward.

Stenotus binotatus Fabricius.* Royal Oak, 7-VIII-'19 (W.D.). Good figures of this species are to be found in "Insect Life," V:90, 1892.

Lygidea rubecula var. **obscura** Reuter. Penticton, 16-VIII-'20 (W.D.).

Lygus pratensis Linne.* Duncan, 4-VIII-'20 (W.D.); Terrace, VI-IX (W.W.H.). Several varietal forms which Knight has under investigation.

Lygus campestris Linne.* Chilcotin, 1-IX-'20 (E.R.B.); Saanich Dist., 6-VI-'18 (W.D.).

Lygus nubilatus Knight. Bull. Cornell Agr. Exp. Sta., No. 391, 1917, p. 584. Saanich Dist., 30-IV, 10-V-'18 (W.D.). Known hitherto only from California. Determined by Knight.

Neoborus amoenus Reuter. Victoria, 27-VIII-'20 (W.D.). Found on poplar and maple trees near the docks, not elsewhere on the Island. The coloration is unusually pale.

Deraeocoris borealis Van Duzee. Proc. California Ac. Sci., (4) IX:354, 1920. Victoria, 30-VIII-'20 (W.D.). Determined by Knight, who has revised the genus. This species was described from Eastern Canada, Maine, and New York, but its range undoubtedly extends across the continent, as is the case with so many northern species.

Coquillettia insignis Uhler. Okanagan Falls, 16-VI-'19 (R.C.T.).

Labops hesperius Uhler. Chilcotin, 23-VII-'20 (E.R.B.).

Labops burmeisteri Stal. Chilcotin, 15-VI-'20 (R.C.T.). On grasses on open range. The determination of this species must be considered provisional, as a comparison with the types is necessary to make the matter certain. This form may be distinguished from **L. hesperius** by its very small size (length, brach. 3 mm, macr. 3.5 mm), the much coarser and thicker scale-like pubescence of the dorsal surface, which almost covers the pronotum and scutellum, and the coloration of the femora, which are black except at apex and not annulate as in **hesperius.**

Hadronema militaris Uhler.* Okanagan Falls, 16-VI-'19 (R.C.T.); Penticton, VI-'19 (R.C.T.).

Hadronema princeps Uhler. Vernon, 29-VII-'20 (M.H.R.).

Orthotylus pacificus Van Duzee.* Royal Oak, 7-VII-'19 (W.D.). Several specimens of this species, of which the description was included in my former report, were collected on Salix in company with **Stenotus binotatus,** to which they bear some superficial resemblance. The extent of the black markings is sometimes greater than the original description would indicate. The anterior half of the pronotum may be entirely black, or with pale anterior margin; the scutellum may be wholly black except for a narrow median pale spot in the posterior half; and the head may be largely black or largely pale.

Phyllopidea picta var. **hirta** Van Duzee.* This form was previously recorded under the genus Bolteria. Knight has shown[9] that this assignment is incorrect, and he has kindly confirmed the determination of the British Columbia material.

Family GERRIDAE

Gerris marginatus Say. Beaver Lake, Saanich Dist., 9-VIII-'19 (W.D.). A brachypterous male having the hemielytra extending to the middle of the fourth abdominal segment.

Gerris buenoi Kirkaldy. Beaver Lake, Saanich Dist., 9-VIII-'19 (W.D.). A brachypterous female having the hemielytra extending to the level of the apex of the middle coxae. Short-winged forms are rare in this species but are of wide spread occurrence, as I have found them on Long Island, N.Y., and Hussey[10] has reported apterous individuals from Michigan.

Family SALDIDAE

Saldula interstitialis Say. Duncan, 17-IX-'19 (W.D.); Saanich Dist., 17-VI-'19 (W.D.); Shawnigan, 2-VIII-'19 (W.D.). These specimens from British Columbia cannot be distinguished from those occurring abundantly in the Eastern States, which at present are considered to represent the **interstitialis** of Say. In working out the Saldids reported on in this paper I have been favoured with the advice of my friend, Mr. J. R. de la Torre-Bueno, who is engaged upon a monograph of the North American species.

Saldula comata sp. nov.

Black, shining, the hemielytra conspicuously marked with dull yellow as follows: a series of narrow spots within the costal margin, variably developed; a large ocellate spot occupying most of the middle areole before the middle; between this and the costal row, two or three large irregular blotches, and behind it two near the membranal suture, the outer long and narrow, the inner very small; a small oval spot at apex of clavus. Membrance translucent brown with one or two dark spots in each areole. Head black, with small yellow spots between ocelli and eyes and in front of the latter; tylus reddish yellow with a black spot at base; antennae black with a reddish yellow streak on the inner side of the first segment. Rostrum and ventral surface black. Legs largely dark reddish yellow, the femora with a black longitudinal stripe of variable width and black dots, the anterior and middle tibiae with a black stripe on the outer side, which is variably developed and does not reach the apex; second tarsal segment yellow, the third black or brown.

Entire dorsal surface, excepting membrane, with legs and antennae, thickly clothed with long, erect, black setae and provided also with a

[9]The genus Bolteria, Bull. Brooklyn Ent. Soc., XIV:126-128, 1919.

[10]Waterbugs Douglas Lake, Occas. Papers Mus. Zool. Univ. Mich., No. 75, p. 11, 1919.

very fine pale pubescence; the setae very conspicuous on vertex, lateral margins of pronotum, and legs; ventral surface similarly clothed, the setae less conspicuous.

Vertex very finely roughened, its least width about equal to the transverse diameter of an eye, provided with diverging grooves before the ocelli, the latter separated by a space slightly greater than the diameter of one of them, and three times as far from the eyes as from each other; the transverse carina between frons and tylus obsolete at middle; tylus elevated, moderately swollen at base; postocular portion of head very short. Antennae slender, as long as pronotum and scutellum; the first segment much the thickest and slightly shorter than least distance between eyes (9-10), almost as long as the third (9-10); second very slender, very slightly curved, a little enlarged toward apex, twice as long as the first; third almost cylindrical, slightly shorter than the fourth (9-11), which is slightly thicker than the third and cylindrical except at ends. Pronotum polished, transverse, more than three times wider than long (47-14); lateral margins slightly curved, convergent, anterior angles evenly rounded; the anterior margin a little narrower than head including eyes; posterior margin broadly emarginate, slightly and evenly curved across middle; callus prominent, convex, not reaching lateral margins, with three discal indentations of which the middle one is deepest, the lateral faint; transverse impression deep, curved, minutely punctate at bottom; posterior lobe about one-half as long as preceding on median line. Scutellum polished, as long as wide, the impression sinuate, situated slightly in front of middle, the posterior lobe longer than the anterior (20-13) on median line. Hemielytra moderately convex, the costal margin strongly curved, broadly flattened and slightly reflexed anteriorly; corium faintly shining, very obsoletely punctate; clavus opaque; veins distinct, the inner forked, with branches reaching membranal suture; membrane with four areoles, the inner longest, extending anteriorly about one-seventh of its length beyond base of the next, posteriorly almost as far as the next; outer margin of membrane thickened and pubescent. Second segment of hind tarsi about as long as the third. Last ventral segment of female more than twice as broad as long (38-14), somewhat produced and broadly rounded at middle. Form rather broadly oval. Length male and female 4.8-5.0 mm; width 2.5-2.7 mm.

Holotype, male, Beaver Lake, Saanich Dist., B. C., 17-VI-'19 (W.D.), in the National Collection at Ottawa.

Allotype, female, same data, in my collection.

Paratype, female, Vernon, B. C., 26-IX-'18 (W.D.), in Downes' collection.

This species is closely related to **interstitialis** Say, from which it is distinguished by the long pubescence, evenly rounded anterior angles of pronotum, shining surface, etc.

Saldula nigrita sp. nov.

Black, moderately shining, the hemielytra almost opaque and ornamented with a few small and inconspicuous dull yellow markings as follows: a wedge-shaped spot near apex of clavus; some irregular ones just within costal margin near middle and near apex; three widely separated in middle areole of corium, of which the central one is most conspicuous; a rounded one between the branches of the inner corial vein near inner basal angle of membrane, and a narrow one occasionally at the fork of this vein. Membrane black, usually with a dull yellow spot near apex of outer corial vein. Head black, sometimes with small dull yellow spots between and in front of eyes and one on apex of tylus. Antennae black, the first segment sometimes faintly marked with dull yellow. Rostrum and ventral surface black. Legs black, the femora and tibiae more or less distinctly marked with yellow toward apex, but not annulate.

Dorsal surface, except membrane, and ventral surface clothed with very fine pale pubescence, the head with a few large black setae.

Vertex very finely roughened and pubescent, its least width somewhat less than the transverse diameter of an eye (8-10), provided with two oblique grooves extending from before the ocelli to the anterior inner margin of eyes; ocelli separated by a space scarcely equal to the diameter of one, three times as far from the eyes as from each other; a prominent transverse carina, recurved nearly to the eyes at each end, separates frons from base of tylus; tylus elevated, slightly swollen at base; postocular portion of head short, nearly cylindrical. Antennae slender, as long as head, pronotum, and scutellum; provided with very fine pale pubescence and, except second segment, with sparse, erect setae; first segment thickest, about as long as shortest distance between eyes, much shorter than third (7-13); second very slender, slightly curved, a little enlarged toward apex, about three times as long as first (23-8); third very slenderly fusiform, more than one-half as long as second (13-23); fourth very slightly broader than third, narrowly fusiform, somewhat shorter than third (12-13). Pronotum very finely rugulose, transverse, about three times wider than long (40-14); the lateral margins convergent, slightly curved especially anteriorly; anterior margin a little narrower than head with eyes; posterior margin broadly emarginate, nearly straight across middle; callus prominent, convex, not reaching lateral margins, with three discal indentations tending to form a transverse groove; transverse impression sharp, curved, finely punctate at bottom; posterior lobe a little shorter than preceding on median line. Scutellum slightly longer than wide, the basal lobe rugulose, the impression sinuate, situated a little in front of middle; posterior lobe almost smooth, faintly transversely rugulose along middle, nearly twice as long as anterior on median line. Hemielytra opaque, obsoletely punctulate, moderately convex, the costal

margins gently curved, rather broadly flattened and a little reflexed anteriorly; veins feebly elevated, the interior forked, with branches reaching membranal suture. Membrane with four areoles, the inner longest, extending anteriorly about one-eighth of its length beyond base of the next and posteriorly almost as far as the next; outer margin thickened, pubescent. Second segment of hind tarsi about as long as the third. Last ventral segment of female more than twice as broad as long (40-15), somewhat produced and broadly rounded at middle. Form rather elongate oval. Length male and female, 5-5.5 mm; width 2.3-2.5 mm.

Holotype, female, Duncan, B. C., 17-IX-'19 (W.D.), in the National Collection at Ottawa.

Allotype, male, same data, in Downes' collection.

Paratypes, male and female, in my collection.

This species may be recognized by its narrow form and its dull black colour, with inconspicuous spotting; it is distinguished from **interstitialis** and allied species also by the strong transverse carina separating frons and tylus, which is very distinct at middle as well as at the sides. According to my interpretation of Reuter's essay[11] at the generic subdivision of Salda (or Acanthia), this form pertains to Saldula Van D. (Acanthia Reut.). I am not fully satisfied that many of the characters which Reuter employs are really of generic value, and some of them are certainly indefinite, e.g., the relative width of head and anterior margin of pronotum and the punctation of the transverse pronotal impression. This latter character is mentioned in the above descriptions and it is present in allied species, although they belong to a group which, according to Reuter, lacks this feature. Probably the punctures are merely developed in varying degrees in the different sections. The characters used by Reuter in separating his genera are included in the present descriptions.

Family NOTONECTIDAE

Notonecta undulata Say.* Vernon, 26-IX'19 (W.D.).

Buenoa elegans Fieber. Beaver Lake, Saanich Dist., 9-VIII'19 (W.D.). Study of a good series has revealed no differences between specimens taken in the west and in the east. The proper application of the names **elegans** and **platycnemis** of Fieber may be considered somewhat in doubt, but these specimens exhibit the characters ascribed to **elegans** by Hussey (*Op. cit.*, p. 18).

[11]Zur gen. Teilung pal. u. neark. Acanthiaden, Ofv. Finska Vet.-Soc. Forh., LIV, Afd. A, No. 12:1-24, 1912.

THE SPHINGIDAE OF BRITISH COLUMBIA

By E. H. Blackmore, F.E.S.

The family **Sphingidae** is very poorly represented in the north-western portion of this continent. In boreal North America there are forty different genera, comprising some 134 species and varietal forms, of which only seven genera and fourteen species are known to occur in British Columbia. Alberta is not much better represented, as only sixteen forms are recorded from that province—just two more than we have. It is interesting to note, however, that eight of the species occur in both provinces. Showing how poorly we are represented here in this family, I may mention that in the State of New Jersey alone fifty different species and forms are recorded. Before taking up the species in detail, perhaps it would be as well to say a few words about the different stages.

Larvae. The larvae of this family are quite characteristic. As a rule they are large and rather remarkable in appearance, the body is cylindrical and naked and most of them have a caudal horn situated near the end of the body on the eighth abdominal segment. Sometimes in place of this horn is a polished eye-like spot. The majority of the species are of some shade of green in colour and usually have oblique stripes of a contrasting colour on the sides. The anterior segments are retractile and when at rest these segments are drawn back and the front portion of the body raised in the air. When in this posture they are supposed to represent the Egyptian Sphinx and it is to this resemblance that the typical genus was named Sphinx. The larvae feed upon leaves of trees and shrubs and are solitary, that is, they do not feed in colonies, but each one feeds by itself upon its appropriate food plant.

Pupae. Most of the species pass the pupal state deep in the ground in simple cells made in the earth; a few species, however, transform on the surface of the ground in imperfect cocoons composed of leaves fastened together with silk.

Adults. The majority of the species of this family have very stout, long, conical bodies, with long narrow pointed wings, which, together with their rapid and powerful flight have given them their common name of Hawk-moths. Sometimes they are called Humming-bird Moths on account of their habit of remaining poised over a flower while extracting the nectar, holding themselves in this position by a rapid motion of the wings. This attitude and the whirr of the vibrating wings gives them a strong resemblance to a humming-bird. The tongue as a rule is very long, sometimes longer than the body, and in some species it is nearly six inches in length when uncoiled. The antennae are somewhat peculiar, being fusiform (that is spindle shaped) and prismatic; they are generally stouter in the male and usually hooked at the tip. They are, as a rule, crepuscular in their habits, flying at twilight and hovering over flowers from which they extract the nectar with

their long tongues. They are the most elegant of all the Lepidoptera, the quiet but exquisite shades of olive, tan, brown, black and yellow, with touches here and there of pink and blue, combine to make a most harmonious coloration.

The different species in British Columbia arranged in accordance with Barnes and McDunnough's Check List are as follows:

(1) 668 **Sphinx vancouverensis** Hy. Edw., or as it is commonly called, the Vancouver Sphinx. This species is fairly common on Vancouver Island, although it is not well represented in British Columbia collections. It is greyish brown in colour, with shades of paler grey and a few scattered black lines.

It feeds on snowberry and is on the wing in July. It occurs from Vancouver Island throughout Southern British Columbia to Kaslo and Rossland. Its range extends southward to about San Francisco and eastward to Alberta and Montana.

There is a variety of this species named **albescens** Tepper, which is supposed to fly with it, but I have not seen a specimen of it in any British Columbia collection. It occurs in Alberta, however, and also in Manitoba; it is a smaller insect, with the costa and outer margin of the primaries a very pale grey, as is also the centre of the thorax. In The Moth Book, p. 51, Holland speaks of **albescens** as having a very dark thorax; this is an error, as that description applies to **vancouverensis,** although his figure on Plate VI is correct.

(2) 690 **Sphinx perelegans** Hy. Edw., or the Elegant Sphinx. This is a species which has been overlooked in our collections. It is rather rare but may be more common than supposed, as it is very liable to be confused with **vancouverensis,** especially by those collectors who are not aware of a similar species occurring in our fauna. It has a much larger wing expanse and differs in the following particulars: it lacks the distinct narrow black line parallelling the outer margin of the primaries; the black sub-apical streak is disconnected, forming in this species two streaks, one slightly below the other; it has also a small brown discal spot on the primaries, and has a distinct whitish submarginal band.

This species was first mentioned by the late Rev. G. W. Taylor in the Can. Ent. Dec. 1909. He took five specimens with him to Ottawa and studied them in conjunction with Mr. Arthur Gibson, and after studying the descriptions of **vancouverensis, albescens, vashti** and **perelegans,** found that they agreed perfectly with the latter. Of the five specimens taken, four were from Wellington and one from Peachland. The only three specimens I have seen are from the Duncan district, where they were taken by the late Mr. E. M. Skinner some twenty-five years ago. In the Bull. B. C. Ent. Soc. Sept. 1906, Mr. Cockle lists **S. drupiferarum** A. & S. from Kaslo, identified from Holland's Moth Book, but I rather doubt this record and believe that it refers to **per-**

elegans, as both species are closely allied, in fact **perelegans** is closer in maculation and size to **drupiferarum** than it is to **vancouverensis.** The species referred to by Mr. W. H. Brittain in Brit. Col. Ent. Socy. Bull. 4, 1914, as **drupiferarum** is probably **perelegans.**

(3) 705 **Smerinthus jamaicensis** normal form **geminatus** Say. (The Twin-spot Sphinx). This beautifully coloured moth expands about 2½ inches. The forewings are fawn, tipped and banded with brown, the hindwings are carmine in the middle, bordered with pale tan; near the anal angle is a large black spot in which there are two smaller blue spots, which gave rise to the specific name **geminatus.**

This species was originally named and described by Drury in error as coming from the Island of Jamaica. He also was unfortunate in having for his type an aberrant specimen in which the large black spot contained only one blue one. Such specimens occur very occasionally, as also does one in which three blue spots occur in the ocellus and this is named **tripartitus** Grt. The first specimens that I saw of **geminatus** in British Columbia were two or three in the collection of Mr. W. Downes, taken at Armstrong, and which I recorded in Gibson's Ent. Record for 1917, with a note that it was "the only record we have for B. C." Since then, however, I have seen several more specimens taken by Mr. A. L. Meugens at Kelowna. The larva feeds upon a variety of trees, including apple, plum, elm, ash, willow and wild cherry. It is quite common in the Middle Atlantic States.

(4) 706a. **Smerinthus cerisyi** race **opthalmicus** Bdv. The Eyed Hawk Moth. This is without doubt the commonest species of this genus occurring on Vancouver Island; although in Eastern Canada it is comparatively rare. It is on the wing in late April and early May and can be found hanging to electric light cables in almost any street of our coast cities; on one occasion I took 9 specimens off one cable wire. The female lays eggs freely in confinement—large round white ones—like small pearls. The species is easily bred, the larvae feeding on different species of willow. The species is distributed from Vancouver Island to the foothills of the Rockies.

(5) 706a. **S. cerisyi opthalmicus** form **pallidulus** Edw. This is a most beautiful form, as all the umber brown and grey colourings are replaced by shades of pale oliveaceous and light tan. It is rather rare in collections; I only know of five or six specimens being taken. I captured one on June 26th, 1913, and bred another one on July 14th of the same year. Mr. Phair of Lillooet has taken one specimen and Mr. Cockle of Kaslo one or two. It is interesting to note that these very pale forms do not emerge until from one to two months later than the typical forms.

(6) 707 **Paonias excaecata** A. & S. (The Blind Sphinx). This genus differs from the preceding genera in that the head is crested and the apex of the costal margin of the hind wings is produced into a some-

what broad lobe. There are only three species in this genus, two of which occur within the Province. Its range in British Columbia is from Vancouver Island to the Kootenays, and it occurs right across the continent to the New England States, where it is quite common. It feeds upon various plants of the order **Rosaceae** but does not confine itself to these, as it will feed upon willow, poplar and other forest trees.

(7) 708 **Paonias myops** Ab. & Sm. (The Small-eyed Sphinx). This is a smaller species than the preceding and somewhat prettier in ornamentation. The food plants and localities are much the same as **excaecatus** but it is much less common. It is rather rare in British Columbia and has been reported from the Okanagan District and from East Kootenay. I do not think that it occurs on Vancouver Island; so far I have not seen it in any collection on the Island.

(8) 711 **Pachysphinx modesta** R. & J. This species has two popular names, the Modest Sphinx in allusion to the quiet modest tints in which it is clothed, and the Big Poplar Sphinx on account of poplar being its chief food plant, although it will also feed on willow. It is the largest of our local sphingids, measuring from 4 to 5 inches in wing expanse. The body and basal third of the fore wing is pale olive, with the outer third of the wing a darker olive and the middle third darker still with a minute olive discal dot. The hind wings are dull carmine red in the centre with a bluish grey patch near the anal angle. The larva when full grown is about 3 inches long, of a pale green colour and coarsely granulated, the granules studied with fine white points, giving it a frosted appearance. This species is recorded from the Okanagan to the foothills of the Rockies, but is somewhat rare. Outside of the Province it extends to the Atlantic coast and southwards into the northern portion of Mexico; but is not common in any locality.

(9) 732 **Haemorrhagia thysbe** form **cimbiciformis** Steph.. (Humming Bird Clearwing). This section of the Sphingidae differs from all others in having the middle of all the wings transparent, that is, free from scales. In many species the abdomen of the male ends in a fan-shaped anal tuft.

In our 1906 "list," **thysbe** is listed from the coast, but I have never been able to trace the specimens that the record refers to. The insect that occurs in British Columbia is the form **cimbiciformis** and it differs from **thysbe** in the outline of the inner margin of the broad outer band of the primaries; in our form the line is even or slightly sinuate, in **thysbe** the line is strongly dentate. It is the rarest Hawk Moth that we have in the Province, I only know of three specimens being taken, although there may be others of which I have no record. The specimen shown was taken in the Bulkley Valley in June, 1914, and the late Wolley Dod records one taken at Field in 1909. Strange to say, it is the commonest species of the genus in Eastern Canada and the New England States. The larva feeds on viburum, honeysuckle and snowberry.

(10) 735d. **Haemorrhagia diffinis** race **rubens** Hy. Edw. (The Bumble-bee Hawk Moth). This species is very common in certain localities on Vancouver Island and occurs all through the Province as far as the East Kootenays. It is very difficult to capture on the wing as its flight is exceedingly rapid and when once struck at and missed it is gone for good. The best and easiest way to capture them is to stand perfectly still, before a patch of blossom which they are known to frequent, with ones net ready to strike, and as soon as one comes within striking distance, to make a sweep at it, creating as little disturbance as possible. One afternoon in early May several years ago I captured over 20 in an hour and a half in a small area about 6 yards long by 2 yards in width. It feeds on snowberry and I have bred them from a species of barberry.

It may not be known to all of you that when these moths emerge from their pupal state, their wings are covered with scales, which however are somewhat loosely attached. These scales become detached after the first flight, thus rendering the wings transparent, with the exception of a narrow border round the edges.

In our 1906 Check List we have listed both **thetis and palpalis,** the latter is now a synonym of the former. The record is wrong, however, as **rubens** is the form that we get in British Columbia; **thetis** is a much smaller species and occurs in Wyoming and Colorado.

(11) 752 **Prosperinus clarkiae** Bdv. (Clark's Day-sphinx). This is rather a small but pretty species, the fore wings are a pale olive green with an oblique brownish median band and a triangular brownish patch near the apex. The hind wings are orange yellow margined with black. It is not a common species by any means. It emerges about the middle of May and is found hovering over flowers in the bright sunshine. It occurs on Vancouver Island and is recorded from Vernon. I also have one specimen from Trail, but so far Mr. Cockle has not taken it at Kaslo.

(12) 753a. **Prosperinus flavofasciata** race **ulalume** Strecker. This species is rather local but it is not uncommon where it occurs. It is a day-flier and like the preceding species is fond of hovering over flowers. In a certain orchard near Cobble Hill, it is very common round the cherry trees when they are in bloom. It is fairly common in late April and early May in some parts of Vancouver. It is also taken at Kaslo and I have it from Mission and Rossland. The larvae are reported to have been found feeding on fireweed.

(13) 761 **Celerio gallii** race **intermedia** Kirby. (The Bedstraw Hawk-moth). So called as the larvae feed upon the common bedstraw **Galium triflorum.** This is the North American representative of **gallii,** which is very common in Europe.

Dr. Dyar in his Catalogue made **intermedia** a synonym of **gallii,** but Rothschild and Jordan in their Revision of the **Sphingidae** have restored the name of **intermedia,** which is applied to our North American

race. It is very common throughout the Province and it occurs all over Canada and the United States. It is often seen hovering over flowers in the twilight and is attracted by light. I have seen dozens of them flying around the arc-lights in the suburbs of Victoria.

(14) 762 **Celerio lineata** Fab. (The Striped Morning Sphinx). This is supposed to be the commonest sphingid in North America and has probably the most extensive range of any of them. Southern British Columbia is probably its northernmost limit; it extends from coast to coast in the United States and ranges southward through Mexico to Central America. In Colorado they swarm about the electric lights in the streets of the cities, literally in hundreds. It is not so common as the preceding species in this Province, but is found in the same localities. The two species resemble each other in colour and markings, but are easily distinguished by **lineata** having six oblique narrow white lines crossing each of the forewings; the thorax is white striped. The larvae of this species show great diversity in markings and are the most variable of all sphingid larvae. It is almost omnivorous—feeding on a great variety of dissimilar plants, including apple, plum, currant, gooseberry, turnip and chickweed. It is closely allied to the Striped Hawk Moth of the Old World (**Celerio livornica**), which has only four white longitudinal stripes on the thorax instead of six as in our species.

EARLY STAGES OF NEPYTIA PHANTASMARIA STRECKER (LEPIDOPTERA)

By Geo. O. Day

A female of this species captured flying at Quamichan, Vancouver Island, on 3rd Sept., 1915, and confined in a chip box, laid 69 eggs in small batches of from two to ten each, the ova securely attached by their sides. Colour a dull light green of a yellowish tinge. Shape bluntly oval—upper and lower sides very slightly flattened—looked at under hand lens no surface markings were visible. Micropylar end of egg rather flat with a central dot. After ten days or a fortnight the colour changed to a purplish gray as if the larva enclosed was in process of formation, but the eggs continued in this condition without hatching. On 17th October I cut one of the eggs open and found it filled with a yellowish green fluid without any sign of larval development. No larvae appeared until the following May, when on the 7th of that month I found two on the lid of the box, evidently just hatched out, and the remainder followed in the course of a few days. Length 3 m.m. Head and claspers wider than the rest of the body; head black. Skin behind the head seemed to fold over it. This fold, and the anal claspers, lighter in colour than the rest of the body, being a watery green. Two

grayish stripes run the length of the body, separated by a black line of equal width, each of the grayish stripes being outwardly edged by black lines along the spiracles, and the black extends to the ventral surface, so that practically, with the exception of the anal claspers and the skin fold behind the head, the larva is striped on the dorsal area with lines of black and gray, the median line being black. On May 16th length 5½ m.m. Head black; the front part of the fold behind the head gray with a dark line behind it; body striped as before, but the colours are dirty green and grayish green. Larvae rather restless in their habits; fed on the tender new growth of Douglas Fir.

On 27th of May length 10 m.m. Head as before. The three pairs of front claspers also jet black. Some of the larvae were still of a dirty green as general tone, but others inclined to plum colour in the darker stripes. The longitudinal lines still distinct, but instead of being about equal breadth, the lighter lines have narrowed, leaving the dorsal central stripe much wider, and also the stripe above the light spiracular stripe slightly wider, in proportion, than before. The dorsal stripe is lighter in colour than the outer ones and is bordered (immediately adjoining the white stripe) with darker, and in this dark edge is situated a dot on each segment.

On 13th June length 18 m.m. The stripes very clearly defined and colours more pronounced. General tone green (simulating the colour of the old spines of the fir), with conspicuous yellow spiracular lines and two other, narrower, light green lines. All the lines (stripes) have dark purplish brown margins. To go more into detail, the central dorsal stripe is broad, bordered by narrow dark lines, then a greenish white stripe again bordered by a dark line throughout its length; between this and the yellow spiracular stripe, the narrow space is occupied by an irregular series of broken dark lines; these dark irregular and slightly wavy lines (5 or 6) are continued all over the ventral area, the ground colour of which is green.

At this stage the head is green, with 14 dark spots. The anus also has black spots.

When eating the larva starts at the outer end of the fir-spine and demolishes it across—not lengthways.

On 3rd July length about 25 m.m. General markings not much changed. Dark spots on head conspicuous. Broken dark lines on the green background not so noticeable.

On 6th July three or four of the most forward larvae had spun a few strands of silk among the pine needles, each making a very flimsy cocoon preparatory to pupating, and on the 7th had changed to a bright green chrysalis with two white stripes down the back, and another stripe on each side extending from the outer margin of the wing-case to the tail. The wing-cases are also white with green veins. The white areas of the wing-cases increase towards the time of emergence,

as if the white wings were showing through. There are a number of dark speckles across each segment. The antennae cases are also green —legs white—proboscis (?) green. Some of the more backward larvae did not pupate until the end of July—not until several imagines from early pupae had emerged.

The first moth (a female) emerged on 25th July, the second (a male) on the 29th, and the third (a female) on the 31st. In all, 29 moths emerged—12 males and 17 females. In the wild state, the moth is sometimes found at rest on the trunks of trees, where it is a conspicuous object; but it is easily disturbed and has a tendency to fly upwards among the branches of the firs.

NOTES ON THE ECOLOGICAL DISTRIBUTION OF SOME ORTHOPTERA FROM THE CHILCOTIN DISTRICT OF BRITISH COLUMBIA

By E. R. Buckell

In British Columbia there are some species of Orthoptera which do not frequent the same type of habitat in different parts of the Province, and the following notes on ecological distribution apply only to the Chilcotin District, and mainly to the Riske Creek Range situated in the angle made by the junction of the Fraser and Chilcotin Rivers.

In dividing a number of species into "groups" or "associations of species" there are a number of plans which might be adopted. In the Chilcotin District, however, the topographical and floral characters lend themselves readily to the formation of four main divisions, populated by fairly distinct groups of species. These may conveniently be called the *campestrian, sylvan, semi-sylvan* and *hygrophilous* groups. The *campestrian* group may, furthermore, be sub-divided into *phytophilous, saxicolous* and *geophilous* species; and the *hygrophilous* group into *humicolous* and *paludicolous* species. These sub-divisions are added to further emphasize the various types of environment chosen by the campestrian and hygrophilous species for their normal habitat (i.e., the habitat in which they are found in greatest numbers). A short description of the district will further explain the choice of these headings.

The Riske Creek Range is an undulating, triangular, tableland, with an elevation ranging from 3,000 to 3,500 feet. It is bounded on two sides by the river valleys of the Fraser and Chilcotin Rivers, which are approximately 1,500 feet below the level of the main tableland.

The steep river valley slopes and the main tableland are open grass lands bounded on the north by forests of fir, spruce and pine. This open grass covered area contains about 300 square miles and forms the home of the campestrian species.

The lower slopes and benches of the river valleys are very much warmer than the upper tableland and are covered with tall bunch-grass and **Chrysothamnus** bushes, and are intersected by numerous ravines filled with rank herbage and small trees. It is here that we find the phytophilous campestrian species, whose habitat is a warm, dry location, plentifully covered with herbage such as the tall bunch-grass of the open slopes, or the tangled brush of the ravines. The colder and higher tableland above supports but little vegetation and has been so heavily overgrazed by cattle that we find nothing but a scant covering of low-growing grasses and small plants which soon dry up in the summer sun. This is the home of the geophilous campestrian species, whose favourite habitat is a bare, sunbaked ground devoid of all tall herbage.

The tableland is composed of a layer of lava rock overlying deep beds of silt and gravel. The rivers in cutting down through this volcanic rock into the softer layers below, have left in many places, precipitous cliffs along the upper edges of their valleys (locally known as "the rimrock"). At the base of these cliffs there is the usual talus of broken rock which reaches down on to the upper slopes of the valleys, forming a favourable habitat for certain species which I am calling the *saxicolous campestrian.*

The forests, bounding the open country on the north, are composed mainly of Douglas fir (**Pseudotsuga mucronata**), Engelmann spruce **(Picea engelmanni)** and Lodgepole pine **(Pinus murrayana).** There is very little undergrowth, the ground being covered with pine-grass. In these forests we find the sylvan species.

The semi-sylvan species are those which are found in the large natural clearings in the forest, where an abundance of tall herbage grows, and in the long grass beneath the aspen poplars which are always found fringing the edge of the forests and dividing them from the open grass-land. The species included under this heading naturally overlap the sylvan and geophilous campestrian species, but are never numerous away from their natural habitat.

Lastly, we have the hygrophilous group divided into the humicolous species inhabiting hay-fields, borders of streams, the thick herbage of "willow-bottoms," and the margins of lakes, and the paludicolous species frequenting marshes and bogs.

The following species were collected during the summer of 1920, and are arranged systematically with short notes on their Ecological Distribution.

Family LOCUSTIDAE

Anabrus longipes Caudell. *Semi-sylvan.* Found inhabiting open glades, Aspen groves on open mountain slopes, and in and around clumps of trees on certain portions of the open range.

Steiroxys (trilineata?) Thomas. A *semi-sylvan* species, fairly plentiful, found in similar locations to **Anabrus longipes.**

Cyphoderris monstrosus Uhler. *Sylvan.* A nocturnal species. May be found during the day time beneath logs and flat stones in the forests.

Family GRYLLIDAE

Gryllus abbreviatus Serville. A *saxicolous campestrian.* An uncommon insect in this locality found only in warm situations close to the Fraser River. Frequents rock-slides and stony ravines, where the males may be heard stridulating during the heat of the day.

Oecanthus quadripunctatus Beut. A *phytophilous campestrian.* Found occasionally among tall plants and rose bushes in dry, warm ravines in the river valleys.

Family ACRIDIDAE

Tettiginae

Acrydium granulatum Kirby. A *humicolous hygrophile.* Taken only in damp grass beneath willow and birch close to water. Both long and short-pronotumed forms were collected.

Acrydium brunneri Bol. A *humicolous hygrophile.* Observed only in one small area among fallen leaves and moss under birch and willow around an upland spring.

Tryxalinae

Amphitornus bicolor McNeill. A *phytophilous campestrian.* Inhabits the bunch-grass slopes of the river valleys. A few found on upper tableland in depressions where the herbage was fairly plentiful.

Chloealtis abdominalis Thomas. *Sylvan.* Very common. Frequenting open forests, especially where logging operations have been conducted leaving the ground strewn with dead limbs. Less plentiful in aspen groves in *semi-sylvan* locations.

Chloealtis conspersa Harris. *Sylvan.* Common. Inhabiting open forests in company with **C. abdominalis.**

Mecostethus gracilis Scudder. A *paludicolous hygrophile.* Collected in wet marshes and flooded areas in wild hay meadows. Flies actively about in the tops of tall grasses and rushes.

Chorthippus curtipennis Harris. A *humicolous hygrophile.* A very common species in long rank meadow grass and under aspens in damp locations. Extending in places into distinctly *sylvan* surroundings.

Platybothrus brunneus Thomas. A *geophilous campestrian.* Was found in great numbers over approximately 1,000 square miles of dry, bare, overgrazed range. The only *geophilous* species of this sub-family collected and, I believe, the first record of a **Tryxaline** occurring in injurious numbers in Canada.

Oedipodinae

Arphia pseudonietana Thomas. A *phytophilous campestrian.* Rarely seen. Taken in small numbers in hot, dry ravines, and among sage brush near the Fraser River.

Camnula pellucida Scudder. A *geophilous campestrian.* This common and destructive species was found everywhere on the open range land.

It is particularly fond of alkaline ground, especially for oviposition. A species with migratory tendencies and flies freely. This species migrated during August into sylvan, semi-sylvan and phytophilous locations in search of food, but returned to the range for oviposition.

Hippiscus sp. A *geophilous campestrian.* A typical geophilous campestrian distributed all over the open range and rarely extending into semi-sylvan or phytophilous surroundings.

Hippiscus (Xanthippus) latefasciatus Scudder. A *phytophilous campestrian.* This large brightly coloured insect is one of the earliest to appear in spring as it hibernates as a nymph. Commonly found on warm bunch-grass flats along the river valleys. Occasionally found on the upper range.

Pardalophora tuberculata Beauv. *Semi-sylvan.* A rare species, taken occasionally in dry mountain meadows.

Spharagemon aequale Say. A *phytophilous campestrian.* Collected only on lower bunch-grass flats close to the rivers, where, in company with **Metator pardalinus,** it did considerable damage to the grass.

Metator pardalinus Saussure. A *phytophilous campestrian.* Very common on lower bunch-grass flats in company with **Spharagemon aequale.** Rare on upper range. Both yellow and red winged forms were seen.

Circotettix carlinianus Thomas. A *geophilous campestrian.* Found only on the dryest and barest parts of the upper range in small scattered colonies.

Circotettix lobatus Saussure. A *saxicolous campestrian.* Inhabits the steep rocky sides of ravines and the base of cliffs in warm locations on the river slopes.

Circotettix suffusus Scudder. A *sylvan* species. This species was most frequently found in the Chilcotin district in sylvan locations, but also inhabits semi-sylvan areas such as open clearings and road sides.

Trimerotropis vinculata Scudder. A *phytophilous campestrian.* Found locally on dry exposed areas on lower river benches.

Trimerotropis sp. A *geophilous campestrian.* A typical geophilous species found commonly on the open range of the tableland.

Acridinae

Melanoplus atlanis Riley. A *geophilous campestrian.* Frequents dry, sandy grass lands on sheltered parts of the range.

Melanoplus femur-rubrum DeGeer. A *humicolous hygrophile.* Restricted in the Chilcotin district to hay meadows and long rank grass; avoiding very dry areas.

Melanoplus bivittatus Say. Mainly a *semi-sylvan* species, adapted, however, to a wide variety of conditions. It was found wherever there was a thick growth of succulent vegetation, such as the borders of streams, and also out on the open range in depressions where there was a good covering of grass.

Melanoplus packardii Scudder. A *phytophilous campestrian*, with geophilous tendencies. Only collected in one locality. Found among bushes on a dry, stony bank near the Chilcotin River at Hanceville.

Melanoplus altitudinum Scudder. *Semi-sylvan.* Found only among the scrub along road sides and in aspen poplar groves.

Melanoplus minor Scudder. A *phytophilous campestrian.* Frequents dry ground among bushes and low scrub, on the lower river valley flats. Found sometimes in typical semi-sylvan surroundings.

Melanoplus bruneri Scudder. *Semi-sylvan.* Found most commonly in semi-sylvan locations, but extends into the geophilous campestrian area where the open range adjoins the forest.

Melanoplus alpinus Scudder. A *sylvan* species. Found throughout the open pine forests, usually above 3,500 feet elevation.

Melanoplus infantilis Scudder. A *geophilous campestrian.* A typical geophilous species and the only Melanoplus found commonly on the open dry range. It chooses the barest of ground for its habitat, and never encroaches upon the semi-sylvan or phytophilous locations.

Melanoplus borealis Fieber. A *humicolous hygrophile.* An inhabitant of the tall rank vegetation beneath birch and willow on the borders of streams. A sluggish species, usually seen resting on the leaves of nettles and other tall plants. A richly coloured insect, probably due to its humid surroundings.

Melanoplus fasciatus Walker. *Sylvan.* A typical sylvan species found among low brush in the forest areas in the higher elevations. In addition to the species of **Melanoplus** enumerated above two species of wingless **Melanpoli** (genus and species not yet determined) were taken in considerable numbers. They were typically semi-sylvan in their choice of habitats. They were found in dry mountain meadows and in aspen groves on the mountain slopes.

TABLE OF THE "LOCUST ASSOCIATIONS" FOUND IN THE CHILCOTIN DISTRICT OF BRITISH COLUMBIA

Group I. CAMPESTRIAN (Inhabiting Open Ground)

PHYTOPHILOUS Species.

Oecanthus quadripunctatus Beut.
Amphitornus bicolor McNeill.
Arphia pseudonietana Thomas.
Hippiscus (Xanthippus) latefasciatus Scudder.
Spharagemon aequale Say.
Metator pardalinus Saussure.
Trimerotropis vinculata Scudder.
Melanoplus packardii Scudder.
Melanoplus minor Scudder.

GEOPHILOUS Species.

Platybothrus brunneus Thomas.
Camnula pellucida Scudder.
Hippiscus sp.
Circotettix carlinianus Thomas.
Trimerotropis sp.
Melanoplus atlanis Riley.
Melanoplus infantilis Scudder.

SAXICOLOUS Species.

Gryllus abbreviatus Serville.
Circotettix lobatus Saussure.

Group II. SYLVAN (Inhabiting Forests)

Cyphoderris monstrosus Uhler.
Chloealtis abdominalis Thomas.
Chloealtis conspersa Harris.
Circotettix suffusus Scudder.
Melanoplus alpinus Scudder.
Melanoplus fasciatus Walker.

Group III. SEMI-SYLVAN (Inhabting Borders of Forests, Poplar Groves, Open Glades, etc.)

Anabrus longipes Caudell.
Steiroxys (trilineata?) Thomas.
Pardalophora tuberculata Beauv.
Melanoplus bivittatus Say.
Melanoplus altitudinum Scudder.
Melanoplus bruneri Scudder.

Group IV. HYGROPHILOUS

HUMICOLOUS (Moisture-loving) Species.

Acrydium granulatum Kirby.
Acrydium brunneri Bol.
Chorthippus curtipennis Harris.
Melanoplus femur-rubrum DeGeer.
Melanoplus borealis Fieber.

PALUDICOLOUS (Marsh-loving) Species.

Mecostethus gracilis Scudder.

In conclusion it is worth mentioning the influence that man has had upon the distribution of some of the Orthoptera of the Chilcotin district. Before this country was settled, the whole of the tableland (geophilous campestrian location) was thickly covered with bunch-grass, and although undoubtedly somewhat colder than the river valley slopes (phytophilous campestrian location), I believe that the Orthopteran fauna was very similar in the two localities.

The use of this country as a cattle range has completely altered the condition of the tableland, or upper range, where the cattle have been allowed to graze unchecked. The bunch-grass has gone, and the range is bare and uncovered by any high growing plants. Species such as **Metator pardalinus, Spharagemon aequale** and **Amphitornus bicolor** no longer find the range to their liking and only a few of them can now be found in some of the depressions where there is an unusual abundance of grass.

These species are now confined to the river valley slopes which have been fenced as "winter ranges" and are not overgrazed by the cattle. The overgrazing of the range, while it has caused the decrease of some species, such as **Metator, Spharagemon** and **Amphitornus,** has undoubtedly created ideal conditions for other species, probably hitherto comparatively uncommon. Among these may be mentioned **Melanoplus infantilis, Camnula pellucida** and **Platybothrus brunneus.** The last species was extremely abundant, causing a serious outbreak over at least 1,000 square miles in the Chilcotin district alone, and as specimens were also secured from the Nicola Valley, it probably extended over 2,000 to 2,500 square miles of open cattle range in British Columbia. This sudden outbreak, in large numbers, of a species never before recorded from the Province, and rarely taken in Canada, is remarkable.

The following species from the above list are believed to be new records for the Province.

Pardalophora tuberculata Beauv.
Mecostethus gracilis Scudder.
Platybothrus brunneus Thomas.
Melanoplus fasciatus Walker.
Melanoplus infantilis Scudder.
Melanoplus borealis Fieber.
Melanoplus minor Scudder.
Melanoplus altitudinum Scudder.

NOTES ON THE FAUNA AND FLORA OF MT. McLEAN, B. C.

By R. Glendenning

During the summer of 1920 this mountain was visited three times in connection with the Natural Control Investigations being carried on by the Dominion Entomological Branch. The insect being studied in this case was the Spruce Budworm, **Tortrix fumiferana,** which has been doing considerable damage to the Douglas Fir in these parts. Perhaps a brief description of the plant associations found on the mountain from base to summit would not be out of place, as no factor has greater bearing on the distribution of the insect fauna than the plant associations.

The life zones encountered on this mountain according to the system of Merriam are as follows:

Base-1000 Upper Sonoran.
1000-1700 Arid Transition.
1700-3700 Humid Transition.
3700-6600 Hudsonian.
6600-Top 7850 Arctic.

At the base of the mountain lies the town of Lillooet in the Upper Sonoran area, i.e., the sage brush country; here the dominant plant is the sagebrush **(Artemisia tridentata)** with Rabbit Bush **(Bigelovia)** and various small herbs of xerophytic habit as **Chrysopsis** the Golden Aster, and the handsome **Gaillardia aristata.** There are a few scattered trees of Yellow Pine **(Pinus ponderosa,** also a little Sumach **(Rhus glabra).** This association has to withstand the fiery heat of summer without relief from the showers which refresh our coast vegetation, or occur at higher elevations on the mountain. Life is at its zenith here early in the year, though throughout the long summer days the variously pitched songs of the Orthoptera are always to be heard. This sagebrush formation extends upwards to the 1,000 feet level, where it gradually merges into the Arid Transition area. It will be fully understood that there is no hard and fast line of demarcation between plant formations, one is only gradually replaced by the next, and at times it is difficult to say which formation one is in. As well, elevation is not the sole factor governing the type of plant formation, as a southern exposure or a dry ridge will carry the association of a lower formation to higher levels, causing an irregular contour. These remarks apply equally to the divisions between all the formations.

In the Arid Transition we have as dominant trees, the Yellow Pine **(Pinus ponderosa)** and our versatile friend the Douglas Fir, and it might be as well to lay stress here on this quality of the latter tree; it being found in three if not four zones and ranging from 1,000 to 6,000 feet, or to within 500 ft. of the limit of trees. These two trees form an open woodland pleasant to pass through and collect in. The underbrush is light and consists of Snowbrush **(Ceanothus sanguineus),** a fav-

ourite food plant of many insects, June berry **(Amelanchier)**, rose bushes **(R. pisocarpa and nutkana)**, with a low covering of the evergreen False box **(Pachystima myrsinites)**, and **Spiraea lucida.** This association persists on the drier ridges for about 1,000 ft. There is here ample material for wood boring insects, consequently Buprestids are frequent. Ants also find congenial surroundings and are numerous both in species and individuals, and seem to delight in getting mixed up with ones food and crawling up ones legs at night. The mound building species are much in evidence; some of their domiciles were noticed that had been torn down by bears. For a student in myrmecology this would be an excellent place to locate.

The Arid Transition and the Humid Transition have a range of elevation of approximately 2,700 ft. or from 1,000 to 3,700 ft. above sea level. They are very similar but the greater rain and snow fall in the upper half causes a ranker growth, and several plants drop out, to be replaced by others. The woods of the Humid Transition have very much of the appearance we are familiar with on the coast. Salal **(Gaultheria shallon)** and Ocean Spray **(Spiraea discolor)**, with barberries **(Berberis nervosa and aquifolium)** form the underbrush and the Douglas Fir is an almost pure stand and forms a much closer growth of timber than lower down.

It is within these areas, the Arid and Humid Transition, that the Spruce Bud moth is most active, and although the damage to the forests has been much less severe than in the Eastern States, a considerable amount of stripping has been noticeable for some years past in this district. In contrast with the outbreaks in New Brunswick, the outbreaks in British Columbia have always been checked in the course of a few years by natural means and it was in order to study these natural control phenomena that time was spent on the mountain.

As is so often the case, birds proved to be the greatest factor in control, and it was an interesting sight to see the flocks of sparrows, chickadees, vireos, warblers and other birds, including the brilliantly coloured western tanager, revelling in the abundance of food there to be found. These birds were exceedingly nimble and tame, and could be watched at less than arms length hopping along a branch, systematically side stepping on each branchlet to pick off the larva ensconced in its nest at the tip. When the branch was finished, they would ascend to the next and work that similarly. So thoroughly was their work done, that considerable difficulty was experienced, and much time spent, in endeavouring to collect sufficient material for parasite rearing work. Speaking from memory, at least 75% of the damaged tips examined for a larva were found to have lost their occupants. Various hymenopterous parasites, Apanteles, Pimpla, Limnerium and Meteorus were also at work but by far the greatest benefit is attributable to the birds, who have now practically controlled the outbreak on Mt. McLean. The

moths were very scarce during their annual flight during July this year, where in previous years hundreds were on the wing.

The larva of the Bud worm has various methods of defence against predators and parasites, two especially being noticeable. Firstly, from their nest at the branch tips formed by the drawn together needles, the larva drops like a plummet on the jarring of the branch and conceals itself amongst the foliage of the branch below, or secondly, in the event of a close approach when the insect is out feeding, it retracts into its cell with great rapidity. This latter move being probably of much use in escaping from some hovering parasite. There is no doubt that the more open nature of the forest in British Columbia than in New Brunswick is conducive to a greater bird population and is the missing factor in the natural control of this pest in eastern forests, where in the gloom of the balsam woods, birds are less plentiful.

Another insect of some interest met with in this zone and the next was a species of stone cricket **(Cyphoderris monstrosus)**. Our evening meal being over, the chores done, we would be sitting over the camp fire when as dusk fell, a high pitched churring would be heard from the neighbouring trees. To locate the maker of this vespertine music was a difficult task, as it was very nearly dark before it commenced, and was one of those curious sounds of all pervading intensity, and apparently ventriloquial. With much perseverance we at length located one of the musicians resting lengthwise on a branch. Very careful approach was necessary to effect capture, as they would simply drop to the ground and be lost in the gloom of the gathering night. Some two dozen specimens were captured during the summer, and the exact economy of this nocturnal serenade is not clear, as no females were encountered, though careful search was made.

Insects are only tolerably abundant in this zone, being much less so than in the open flower slopes around 5,000 ft., but there were quite a few micros on the wing and large robber-flies were frequent; one being netted with a rare noctuid in his talons, quite uninjured and now in the collection of Mr. A. W. Hanham.

After 3,700 ft. altitude is reached, more boreal conditions become evident. Our plant association alters once more and we are in the Hudsonian area. Of trees, the Douglas Fir still persists but others appear, the mountain representatives of our lowland conifers, namely, spruce (**Picea engelmanni**, balsam **(Abies lasiocarpa)**, hemlock **(Tsuga mertensiana)**, and two pines **(Pinus contorta** and **albicaulis)**. The mountain juniper **(Juniperus sibirica)**, rhododenron **(Rhododendron albiflorum)**, and Devil's Club **(Fatsia horrida)** also occur. These form rather dense growth in the draws but on the ridges they give way to the flower slopes that in July are, I think I am safe in saying, unmatched in North America for beauty to the artist and for interest to the entomologist. Here herbs are at their zenith and a riot of colour is provided

for the eye and a feast of richness for the innumerable flower frequenting insects. Lupines, Pentstemons, Arnicas and Asters are amongst the commoner herbs, and syrphids, bombyliids and various hymenoptera and lepidoptera come in droves to the feast. A considerable amount of collecting was done in the neighbourhood of these flower slopes, as well as in the alpine meadows above timberline. Some of the material collected is named, but much is not and should provide many new and interesting records of alpine and subalpine species when worked over by specialists. Diptera and hymenoptera were the chief orders collected in, but on the occasion of my last trip in August I had the pleasure of the congenial and erudite company of Mr. A. W. Hanham, who gathered many choice specimens of lepidoptera and coleoptera, some of which are also yet undetermined.

Five days were spent in camp at the 5,000 ft. level last August, and it might be as well to mention here that camping at this elevation in the dry belt of British Columbia is not at all unpleasant. The nights are not unduly cold, not nearly so cold as those experienced at 4,000 ft. on Mt. Cheam in the wet coast strip.

From the camping place on Mt. McLean at 5,000 ft. there is another 1,500 ft. of open Hudsonian association before the timber line is reached at 6,500 ft. This last 1,500 ft. is very steep going but pleasant and open. Where water is near the surface, the vegetation is quite rank, and coarse growing herbs abound. Collecting was good here in August on the Umbellifers **Angelica Lyallii** and **Heracleum lanatum. Aster foliaceus** and **Erigeron salsuginosus** also were much patronized by insects and some fine **Pachytas,** a dull yellow Cerambycid, were taken here. Just before leaving the timber, under some horse dung, were found some long legged bugs, black with a reddish shield; they were apparently feeding on the larvae of a dung beetle there. This proved to be a rather rare insect, **Alydus scutellatus,** and Mr. Downes, who identified it, informs me only taken once before from British Columbia.

To those who have toiled up a mountain side through the gloom of the forest I need not describe the joyous feeling attendant on emerging from the timber and gaining the open slopes of an alpine summit. To those who have not, I will merely say they have a treat in store. The timber line on McLean is quite sharply defined, and from the edge of the trees upward the country consists of bare rocky ridges, with occasional dwarfed clumps of conifers. The ridges, although apparently bare, are not really so, as a close mat of prostrate herbs covers them, prostrate perforce, the winds occasionally being so strong that mounted Indians decline to face them while hunting. Grasses, sedges, potentillas, dwarf lupines, heathers, saxifrages, the moss campion and the handsome **Eriogonum subalpinum** are here at home, but perhaps the commonest plant is the alpine avens, **Dryas octopetala.**

These plants are arctic in distribution and persist from timber line to summit 7,850 ft. Some of them will be found up to 10,000 where that elevation is reached.

On our visit early in July the snow was just commencing to go on these alpine slopes and but little was moving; but in August insect life was abundant in this zone. Various species of grasshoppers are to be found, lepidoptera are numerous and in fact all orders of insects are represented, often by rarely taken species, the joy of the cabinet systematist. Parnassius butterflies were abundant here in August, as were blues of several species. That very common habit of several alpine species of butterflies of closnig their wings and turning on their side was noticed. The most insect frequented flowers on these alpine slopes were the arnicas **(A. latifolia and parryi)**, a solidago **(S. corymbosa)** and two species of **Agoseris**, dandelion-like plants. The richly coloured willow herb, **Epilobium latifolium** was neglected except by bees.

I would like to record here while dealing with this subject an interesting little episode I witnessed. Away on the side of one of these lone bare wind-swept ridges was a small semi-sheltered depression still green and carpeted with a lovely bunch of Arnicas: collecting was good here. On one of the clumps of arnica I noticed a very large, heavy bodied bumble bee; it was busy robbing one of the waving heads, which having completed, it attempted to cross to another nearby whenever the fitful gusts of wind blew one in its direction. Several unsuccessful attempts were made to hold with the front pair of legs the waving blossom, and at least half a minute passed before it was at length successful in holding and scrambling over on to another flower without having recourse to flight. I think this shows more **reason**, than that quality described as **instinct** by naturalists.

Another interesting sight was some clumps of an alpine willow **(Salix arctica)** about 18 inches high covered with the pupae of a chrysomelid (leaf-eating) beetle. They had completely skeletonized the foliage and the adults were just commencing to emerge. It is a rare species and I have not yet received the name. There must have been thousands on these few bushes and a strong inky odour was prevalent in their proximity.

Some distance above timber line, at 7,000 ft. to be exact, two small lakes, each about ½ acre in extent, were found. Here two species of water beetle, a tipulid (daddy-long-legs) and a dragonfly were noticed, also some caddis larvae. These lakes can only be free from ice for about eight weeks in the year. In the mud by the margin the footprint of a wader (curlew?) was noticed, thus exemplifying one of the methods by which water insects probably reach these isolated places.

Insect life was common at or near the very summit; grasshoppers were plentiful and several small butterflies were taken within a few yards of the top, wherever a slight depression gave shelter from the

wind, a copper **(Heodes cupreus)** and a blue **(Plebius podarce)** and several others not yet determined. These species are dwellers on the rock slides (not very good ground for chasing them) and frequented the clumps of **Solidago** and **Aplopappus** there to be found. Several specimens of noctuids of the alpine genus **Syngrapha** were also taken early in the afternoon.

The usual alpine animals were seen. Hoary marmots whistled at our intrusion of their solitudes, and rock rabbits squeaked and hid in the rock slides. Two willow ptarmigan in mottled summer plumage were very tame, and allowed good photographs to be taken. Pipits were encountered frequently and a golden crowned sparrow appeared to be nesting in a clump of wind depressed firs. There is certainly lots of insect food here for these birds during the brief summer.

To anyone wishing to spend a short time collecting under alpine and subalpine conditions, no better mountain is known in these parts. There is an immense area of land above timber line available and by no means worked out. One can travel all day and not cover the same ground. There is a good horse trail from base to timber line, used by the local inhabitants when hunting or when opening their irrigation ditches, which convey the water from the melting snows to the parched land of the valleys. Camping is pleasant, mosquitos being scarce; and its proximity to the dividing line between wet and dry belts makes it a rich field botanically and therefore entomologically.